

**Cybernet**

*ImageTwo* RC

AM/FM Stereo Tuner  
T2-RC

**Service Manual**

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## Specifications

### FM Tuner

Frequency range	87.5 to 108.0 MHz
Sensitivity	10.3 dBf (1.8 microvolt IHF '58)
50 dB noise quieting sensitivity	
Mono	16.6 dBf (3.7 microvolt IHF '58)
Stereo	37.2 dBf (39.2 microvolt IHF '58)
Total harmonic distortion	1,000 Hz
Mono	0.10%
Stereo	0.20%
S/N	
Mono	75 dB
Stereo	70 dB
Frequency response	30 to 15,000 Hz +0, -0.5 dB
Alternate channel selectivity	80 dB
Capture ratio	1.2 dB
AM suppression	55 dB
Spurious response rejection at 98 MHz	85 dB
Stereo separation at 1000 Hz	45 dB
Output voltage	0.775V

### AM Tuner

Frequency range	531 to 1,602 kHz
Sensitivity	300 microvolt/m
Selectivity	45 dB
Image rejection at 1 MHz	50 dB
S/N	50 dB
Dimensions (W x H x D)	400 mm x 58 mm x 255 mm

## Instruction Information

### Features

The Cybernet Image-II with Remote Control System is a unique, sophisticated high-fidelity stereo system that combines a high quality separate pre- and main-amplifier R2-RC and A2-RC, a front-loader, logic-controlled stereo cassette deck with Dolby\* noise reduction system C2-RC, a high-sensitivity digital PLL synthesized AM/FM tuner T2-RC, and a handy battery-operated remote control transmitter X2-RC. The model T2-RC is specifically designed to conform with other matching components into a complete stereo system, and almost all functions are duplicated on X2-RC. It features the following.

PLL [Phase-locked-loop] synthesized 50 kHz FM/9 kHz AM digital tuning with either automatic or manual mode. Micro-computer memory feature for 12 stations for AM and FM. Dual-element ceramic filters for razor-sharp selectivity in the IF amplifier stage. PLL multiplex demodulator for stable stereo multiplex performance. Previously-selected frequency memory for easy access to the previous frequency and mode.

### Tuner Connections

Refer to pictorial connection diagram.

**Connection to P2-RC. Very Important: Do not turn on main amplifier power switch until all inter-component connections have been completed, or power supply electronics in the main amplifier will be damaged.**

The tuner T2-RC is connected to the preamplifier P2-RC by means of two cables terminated with DIN type plugs. No other connections are necessary. These cables feed power and remote control command from the preamplifier to the tuner,

10.3 dBf usable sensitivity. Almost all functions remote-controllable from X2-RC remote control transmitter.

\* TM Dolby Laboratories.

### Installation

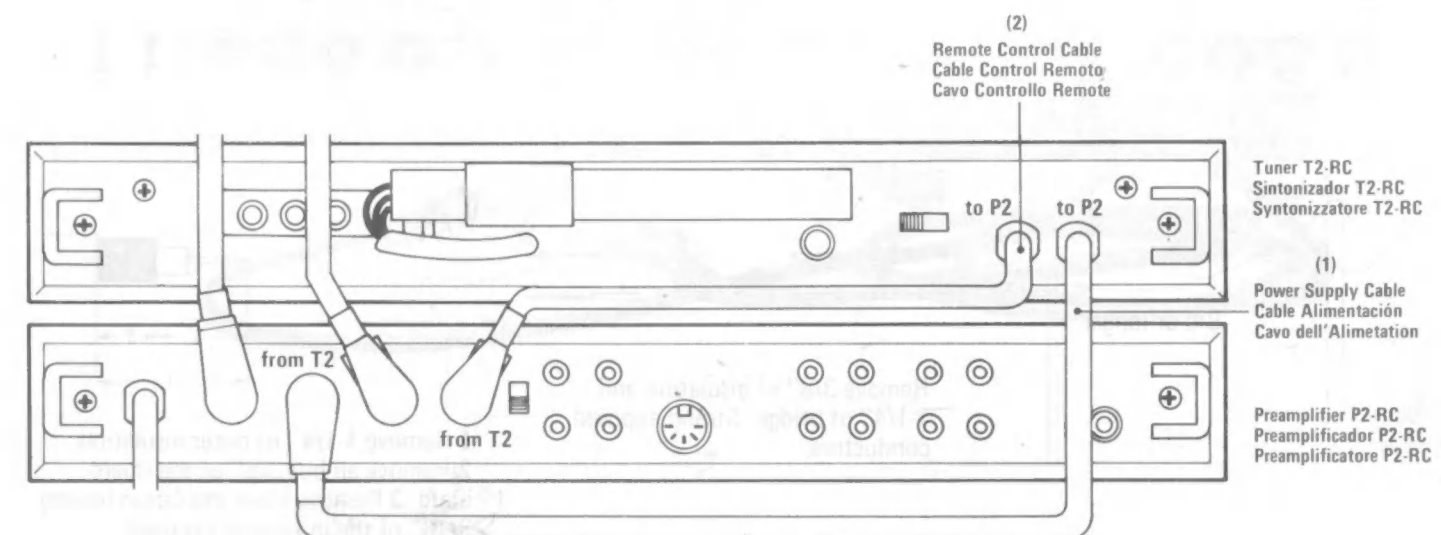
Installation of your tuner is not complicated. However, the following guidelines must be followed for satisfactory performance and ease of operation of the unit.

Do not remove cover — there are no user serviceable parts inside the unit.

The equipment must not be exposed to excessive dust, moisture, or direct sources of heat or sunlight.

To clean the cabinet, wipe with a cloth soaked in a neutral cleaner or a polishing cloth. Do not use benzine or thinner which will damage the cabinet finish.

and tuner output to the preamplifier input circuit. (1) Connect 8-pin metal-housed plug of the cable [Supply to P2] to the socket [Supply from T2] on the preamplifier rear panel. (2) Connect 6-pin plastic-housed plug of the cable [Remote to P2] to the socket [Remote from T2] on the preamplifier rear panel. **Do not turn on the power switch on the main amplifier until all system connections are completed.**



## Antennas

**Ferrite Loopstick Antenna.** The ferrite loopstick antenna is a sensitive pick-up element of the AM tuner section. For maximum station pick-up, it must be properly positioned away from the rear chassis and other metallic surfaces. The associated connecting cables should be dressed as far away as possible. For optimum performance, the antenna should be positioned for maximum signal strength when the unit is tuned to the desired station. Use signal-strength indicator for reference.

**External AM Antenna.** AM external antenna terminal [ANT-AM] is provided for a properly designed long wire AM antenna system. Such antennas are useful when the desired stations are at a considerable distance from the tuner. A simple long wire antenna can consist of a length of single conductor, insulated wire of 9 meters or longer, extending from the ANT-AM terminal to the outside of the building. This wire should be positioned away from electrical cables and appliances. As a rule, the longer and higher the antenna, the better the reception. However, as signal pick up of broadcast stations is increased so also is the pick up of undesirable man-made interference.

**Supplied 300 Ohm FM Dipole.** An FM dipole antenna is supplied with your new tuner. In strong signal area, this should be more than adequate for reception of most FM stations. Antenna connections are made to the terminal strip marked ANTENNA-FM-300 Ohm located adjacently to the AM external antenna terminal. The dipole leads are connected to the screws marked 300 Ohm. The ground screw is not used for the dipole antenna. The dipole should be unfolded to its full T-type size and oriented for optimum performance. Dipole

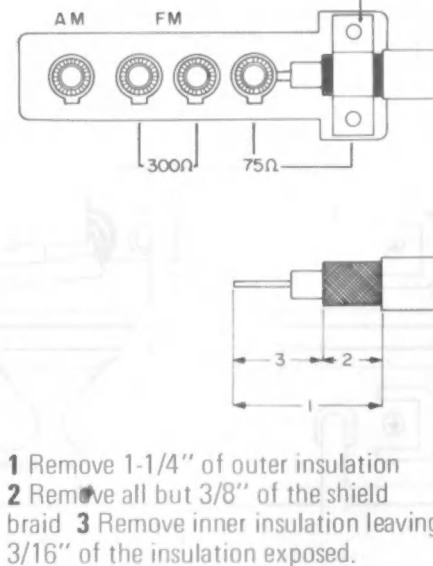
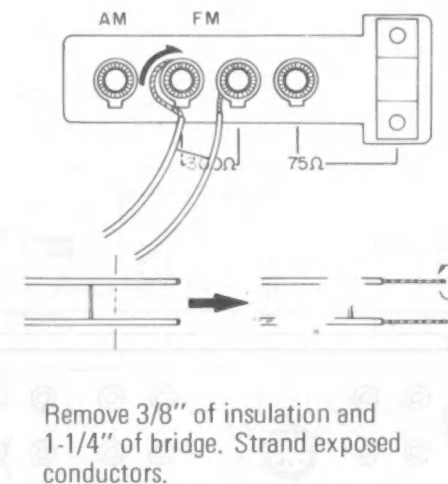
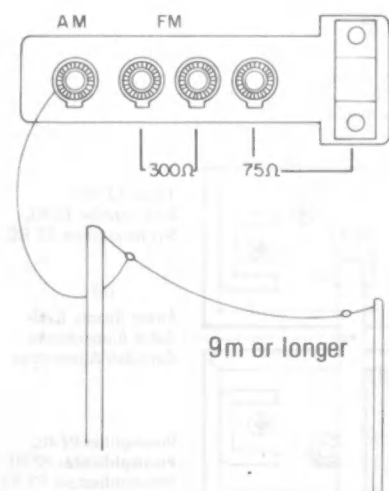
## Cable Preparation and Hook-Up

AM Long-Wire Antenna

300 Ohm Twin-Lead

75 Ohm Coaxial Cable

Clamp conductors under screws then secure.



Remove 3/8" of insulation and 1-1/4" of bridge. Strand exposed conductors.

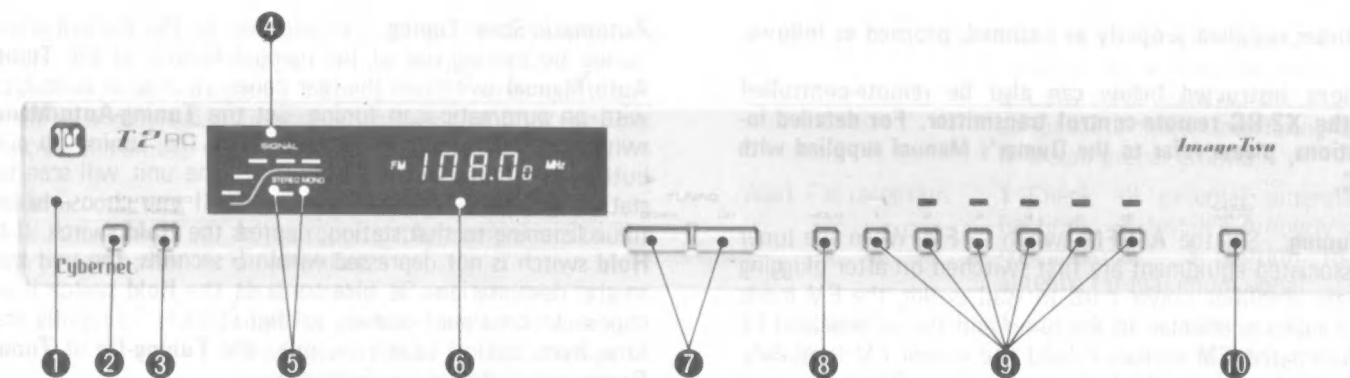
- 1 Remove 1-1/4" of outer insulation
- 2 Remove all but 3/8" of the shield braid
- 3 Remove inner insulation leaving 3/16" of the insulation exposed.

antennas are most sensitive to FM reception when positioned perpendicular to the station.

**Exterior 300 Ohm FM Antenna.** For fringe [weak signal] areas, or areas where interference to FM reception is high, the use of a log-periodic or Yagi-type antenna system is recommended. These antennas are directional and high gain in nature thus tending to reduce most undesired interference due to reflected signals [multipath distortion] and ignition noise. In areas where stations are located in different directions from the point of reception, the antenna must be positioned for optimum reception of individual stations. For this reason, a good quality rotor is suggested. To minimize the introduction of multipath distortion and ignition interference by the antenna lead-in wires, the use of balanced and shielded 300 Ohm [twin lead] cable is recommended. Unshielded twin-lead is suitable where the lead-in wire length from the antenna is short, and when used it should be twisted at the rate of 5 to 10 turns per meter. Long lead-in wires can act as omnidirectional antenna and can cancel the advantages of directional antenna systems. Shielded 300 Ohm cable consists of two inner signal conductors with an outer shield. An insulating jacket is also provided, covering the shield. The two signal conductors are connected to the screws marked 300 Ohm and the shield is connected to the screw marked **Ground**.

**Exterior 75 Ohm FM Antenna.** A second antenna terminal is provided for connecting an unbalanced 75 Ohm antenna cable. This terminal should be used whenever a 75 Ohm coaxial cable is used as a lead-in from the antenna. The braided outer conductor is connected to ground clamp.

## Control Functions



**1 Back-Up Indicator.** Memory back-up indicator. Lights up even while system power is off.

**2 FM/AM Switch.** Selects the program source to be received. This selection mode will be automatically memorized so that you will later be able to access to the previous mode of reception when power is turned off and on again.

**3 Stereo/Mono Switch.** Determines the manner in which a received FM station is reproduced through the tuner. When listening to a stereo FM station, depressing this switch will cause the unit to mix the left and right channel signals detected from the station and reproduce it through both channels monophonically. The released setting of this switch will provide automatic stereo FM reception mode. This is indicated by the illuminated **Stereo** or **Mono** indicator.

**4 Signal Strength Indicator.** Used for tuning on both AM and FM modes. The stronger the signal received, the more dots are illuminated.

**5 Stereo/Mono Indicators.** Lights up to indicate the receiving mode in FM reception — stereo or mono. Deactivated in AM mode of reception.

**6 Digital Frequency Display.** Shows the frequency of a station to which the unit is tuned, directly. Also indicates AM or FM mode and a sign to accept memory presetting [MEMORY].

**7 Tuning-Up/Down Pushbuttons.** When the **Tuning-Auto/Manual** switch on the rear of the unit is set to the **Auto**, these pushbuttons will start the automatic-scan to a station either upscale or downscale. When the **Tuning-Auto/Manual** switch is set to **Manual** each time depressing either pushbutton will tune the unit to the next available station assignment precisely 50 kHz away for FM, and 9 kHz away for AM.

**8 Hold Switch.** Used when automatic-scan to stop the scanning at the desired frequency. If the **Hold** switch is not depressed within 5 seconds after the scan has temporarily stopped at a station, the unit will automatically scan to the next station.

**9 Memory Pushbuttons.** Used for automatic memory push-button tuning on AM and FM. Each of 6 pushbutton may be preset to both AM and FM stations.

**10 Memory Write Switch.** Used when presetting AM and FM stations for automatic pushbutton tuning.





Tuner Operation

With tuner installed properly as outlined, proceed as follows:

Functions instructed below can also be remote-controlled from the X2-RC remote-control transmitter. For detailed informations, please refer to the Owner's Manual supplied with X2-RC.

**FM Tuning.** Set the **AM/FM** switch to **FM**. When the tuner and associated equipment are first switched on after plugging the main amplifier power cord to wall outlet, the FM mode is automatically selected in the tuner and this is indicated by the illuminated **FM** indicator [and the lowest FM frequency will be displayed] on the frequency display. Otherwise, each time you turn on your stereo system, the previous mode and frequency are selected in the tuner automatically. Set the **Tuning-Auto/Manual** switch on the tuner rear panel to **Manual**. Press the **Tuning-Up** pushbutton to tune upscale and press the **Tuning-Down** pushbutton to tune downscale. Each time either pushbutton is depressed, the unit is tuned to the next available FM station assignment precisely 50 kHz away. No fine tuning is necessary. To tune upscale or downscale rapidly, press the either pushbutton and hold it in position. Release the pushbutton when you have tuned to the desired station. If you tune beyond the ends of the scale, the unit tunes automatically to the opposite end and continues.

**AM Tuning.** Set the **AM/FM** switch to **AM**. When the tuner is first switched on after plugging the main amplifier power cord to the wall outlet, the FM mode is automatically selected in the tuner [and the lowest FM frequency is displayed on the frequency display]. Otherwise, each time you turn on the stereo system, the previous mode and frequency are selected automatically. Set the **Tuning-Auto/Manual** switch to **Manual**. Press the **Tuning-Up** pushbutton to tune upscale, and press the **Tuning-Down** pushbutton to tune downscale. Each time either pushbutton is pressed, the unit is tuned to the next available AM station assignment precisely 9 kHz away. No fine tuning is necessary. To tune upscale or downscale rapidly, press either pushbutton and hold it in position. If you tune beyond the ends of the scale, the unit tunes automatically to the opposite end and continues.

Muting Level Adjustment

One of the normal characteristics of FM is the loud rushing noise heard between stations. The tuner incorporates a special muting circuit which is used to eliminate this noise between stations on FM, so that when tuning over the FM band each station will break through from a background of silence. The muting level which a signal must overcome in order to be heard is adjusted with the **Mute Level** control on the rear of the tuner. To adjust the control first set the **AM/FM** switch to **FM**. Set the **Tuning-Auto/Manual** switch on the rear panel to **Manual**. Press either of the **Tuning-Up/Down** pushbuttons to the frequency in which no FM station is received. Only background noise should be heard in this condition. Rotate

**Automatic-Scan Tuning.** In addition to the manual station tuning by making use of the manual feature of the **Tuning-Auto/Manual** switch on the rear panel, your tuner is equipped with an automatic-scan tuning. Set the **Tuning-Auto/Manual** switch on the rear panel to **Auto**. Press the **Tuning-Up** pushbutton or **Tuning-Down** pushbutton. The unit will scan to a station and pause on it for 5 seconds. If you choose to continue listening to that station, depress the **Hold** switch. If the **Hold** switch is not depressed within 5 seconds, the unit scans to the next station. Be sure to press the **Hold** switch if you choose to continue listening to that station. To rapidly scan-tune from station to station, press the **Tuning-Up** or **Tuning-Down** pushbutton for each change.

**Pushbutton Tuning.** Each of six preset pushbuttons may be preset to an AM station and an FM station for automatic pushbutton tuning [6 AM/6 FM; 12 in all]. Set the **AM/FM** switch as desired. Adjust the **Tuning-Up/Down** pushbuttons (and **Hold** switch, if required) for the desired station. Press the **Memory Write** switch. Now the word **Memory** appears on the frequency display area. This is to indicate that the unit is ready to accept presetting the station to memory. Depress one of the preselection pushbuttons. The word **Memory** should disappear. Repeat above steps for each pushbutton. You may later use pushbutton to select the station you wish to hear, by merely depressing it.

If you failed to press the pushbutton within 5 seconds after the **Memory Write** switch is depressed, depress the **Memory Write** switch again.

**FM Stereo Reception.** When tuned to an FM stereo broadcast, the tuner will automatically switch from mono to stereo operation, provided that the **Stereo/Mono** switch is set to **Stereo**. Stereo broadcasts are indicated by the illuminated **Stereo** indicator in the frequency display area. Maximum reduction of background noise on weak stereo FM stations will be obtained by switching the **Stereo/Mono** switch to **Mono**. This will, of course, put the tuner in a monophonic mode of operation.

the **Mute Level** control counterclockwise fully then slowly clockwise until the background noise [hissing sound] just disappears. In this condition, when tuning over the band [in either manual or auto-scan mode], each station will break-through from a background of silence, and any signal to stop scanning and be heard must now be slightly stronger than the average noise. Clockwise rotation will increase the threshold level which a signal must overcome to be received and only strong signals will be tuned in and be heard at **Max.** position. If you want to tune in very weak stations, set the control fully counterclockwise **Min.**

Trouble Shooting Guide

The following guides are intended as an aid in correcting problems you may encounter when setting up the stereo system. Although suggested remedy might seem quite elementary, it may be sufficient to make corrections without returning the unit to your dealer.

Problem	Suggested Remedy
Tuner inoperative when system power is on.	<b>1</b> Improper cable connection to the preamplifier. <b>If the cable is not inserted to pre-amplifier socket, turn off main amplifier power switch. Do not attempt to connect it to preamplifier with system power on.</b> <b>2</b> Improper amplifier power plug connection to wall outlet. Check for correct voltage supply.
Indicator(s) lights up but no tuner output.	<b>1</b> P2-RC preamplifier not selecting the tuner output. Depress <b>Tuner</b> switch on the preamplifier. <b>2</b> Check for proper cable connection from tuner to preamplifier.
Weak AM reception.	<b>1</b> Position loopstick antenna for maximum station pick up. <b>2</b> Locate tuner away from metal surface. <b>3</b> If building construction uses alminum foil faced insulation, metal lath, or steel framing, AM reception will be poor.

Weak FM reception.	Install external AM antenna. <b>4</b> Locate tuner as far as possible from TV set. <b>5</b> Locate AM external antenna as far as possible from interfering source. <b>6</b> Install proper ground. <b>1</b> Check all external antenna connections. <b>2</b> Install a properly designed antenna. <b>3</b> Position receiving antenna for maximum signal.
FM Multipath distortion.	<b>1</b> Caused by a broadcast signal reaching from two directions; #1 directly from transmitter to tuner, #2 the same signal but received as a reflection from a nearby building or other surfaces. Position receiving antenna for minimum distortion [usually maximum signal].
Noisy FM reception.	<b>1</b> Install external antenna. <b>2</b> Use shielded lead-in wire. <b>3</b> Install proper earth ground. <b>4</b> Rotate antenna for maximum signal. <b>5</b> Connect power line filters to interfering appliances.

Circuit Description

PLL Frequency Synthesizer

The FM local oscillator is comprised of a transistor Q3, and a tuning circuit including an oscillator coil T4 and tuning capacitor(s) D4 (varicap diode). The transistor Q3 is being oscillated at a frequency of a receive frequency + 10.7 MHz, and its output is applied to the prescaler IC U6 through a buffer transistor Q4. The prescaler U6 counts down the local signal frequency into a lower frequency (1/20) suitable for phase comparison in the PLL circuitry. Thus obtained low frequency is applied to the pin 3 of PLL IC U7 through a buffer amplifier Q8, and the resultant phase error signal developed at pin 10 is applied to the active LPF filter consisting of transistors Q10 and Q11. Finally the filtered error signal is applied to the oscillator tuning capacitor (varicap diode) D4 to correct (or to generate a new) oscillating frequency.

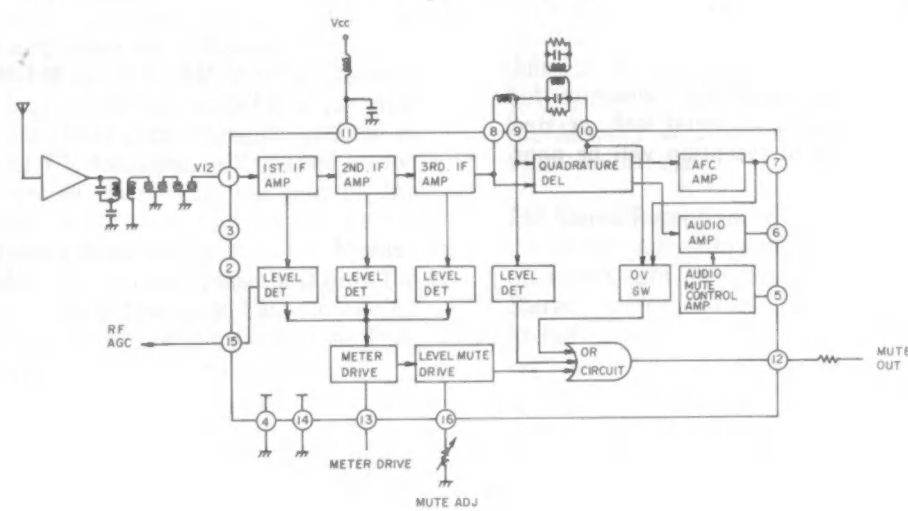
In case of AM local oscillator, the oscillating signal output from the AM oscillator is directly applied to the PLL IC input circuit (pin 3) through a buffer amplifier Q9, and the resultant DC error signal is fed back to the AM oscillator tuning diode D6 also through the LPF filter to correct the oscillator frequency.

FM Tuner

The FM Front end consists of two dual gate FETs and a local oscillator and its buffer. The first FET is used as a FM RF amplifier and the second as a Mixer amplifier. Each gate of the mixer is connected to the RF amplifier output and a local signal injection circuit, respectively. The mixed and resultant IF signals are then led to the IF amplifiers Q5, U1 and U2. The U2 is a multifunction IF system IC including, three stages of limiter/amplifiers, FM quadrature detector, Meter driver, audio mute signal, etc. For further detail of the IC refer to the IC block diagram shown below.

The detected audio outputs (mono or stereo composite signals) are developed at pin 6 of U2 and applied to the pin 2 of MPX decoder IC U5. The decoded left and right channel outputs are obtained at pin 6 and 7 of the same IC and led to the multi-pin connector through low pass filters are one stage(s) of audio amplifier(s).

Block Diagram of IC, U2:



Signal Meter

The IF system IC U2 develops signal meter drive voltage at its pin 13. The drive voltage is led to the base of Q14/Q15 which in turn drives the signal meter LED drivers Q1-Q5, depending on the signal strength received.

Stereo/Mono Switching

The stereo decoder IC U5 operates as a stereo decoder when its pin 16 is applied by a voltage lower than 1.4V. First inverter output (pin 6 of U4), which develops a high output with increased antenna signal input, is connected to the transistor base of Q18 and makes the Q18 conductive when the FM antenna input signal level is increased, then the pin 16 of U5 is grounded through the emitter-collector of Q18, resulting in stereo mode of operation. The pin 9 of U5 develops a low voltage during stereo mode of operation or a high voltage during mono mode operation, and these voltages are used to make the stereo/mono lamps turn on or off.

When FM antenna signals higher than the stereo threshold level is applied to the antenna circuit, the pin 4 of U4 becomes low, and this makes Q13 conductive (common circuit for stereo/mono LEDs).

On the other hand if the U5 operates in stereo mode of operation, the pin 9 develops a low output, then the stereo LED will turn on. However, if the pin 9 develops a high output, the transistor Q22, the base of which is connected to the pin 9, is turned on, then cathode side of the mono LED is grounded through collector-emitter of Q22, thus the mono LED is turned on.

Muting Operation

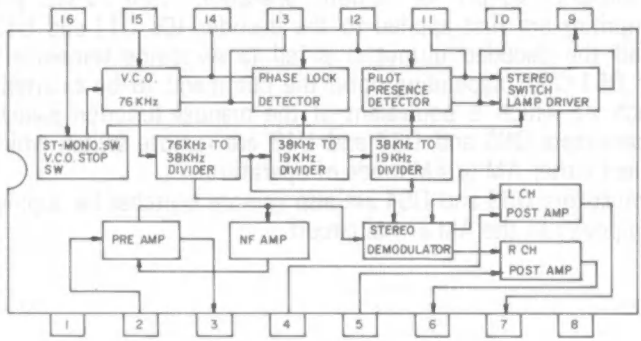
1. FM Muting

Pin 12 of FM IF system IC develops a positive voltage in the event of a low IF input signal level to drive the muting circuit. The positive voltage is first applied to the first inverter pin 7 of IC U4 and the output is obtained at the second inverter pin 4 (since the first and second inverter is connected in series, the second inverter output is in phase with the first inverter input). The output is then connected to the pin 21 of the controller IC U1. The U1 is designed to develop a logic high voltage at its pin 3 when the pin 21 is applied by a logic high voltage. Since the pin 3 is connected to the base of first muting stage of Q19, the Q19 is turned on in the event of low IF input, and this makes all transistors Q27, Q28, Q30 and Q31 conductive to the ground, thereby muting the audio signals.

2. Muting during Scanning Operation

During scanning operation, the muting circuit is also actuated to eliminate undesirable noises caused by scanning operation. During scanning operation, the controller IC U1 also develops the high level voltage. And the FM circuit will be muted as described just above. On the other hand, in the AM circuit, each base of Q6 and Q7 is supplied from the pin 3 of U1 (logic high) and becomes conductive (namely each RF output and detector output is short-circuited, respectively). Thus the audio outputs will be muted out.

Block Diagram of Stereo MPX Decoder IC,  $\mu$ PC1173C:



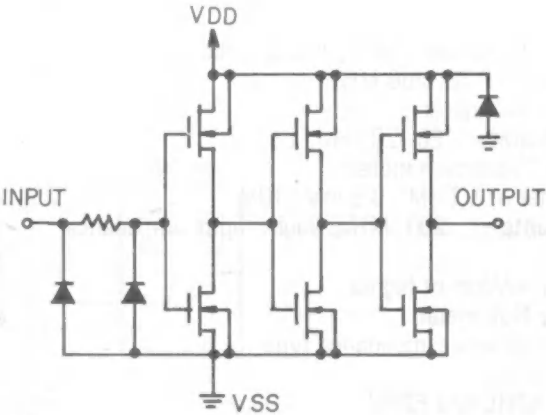
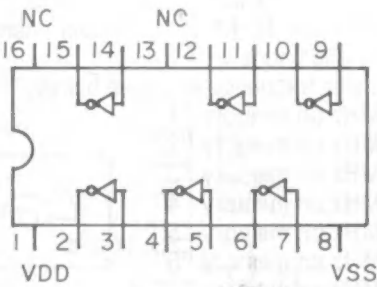
Scan Stop Signal

To secure good scan stop accuracy, the scan stop signal must be narrow and in the center of IF bandwidth. This will be conducted as follows:

As already described, during scanning operation, pin 3 of U1 develops a high voltage, and this is applied to the base of Q65 and makes it conductive, then the FET Q16 is cut off and the resistor connected across the FET is directly connected to R51 in series. The increased resistance (reduced load to the IF circuitry) makes final IF band width narrow. In case of AM operation, a fraction of IF output signal is obtained and further amplified by a narrow band additional IF amplifier consisting of amplifiers provided between pin 9 & 10 and pin 11 & 12 of U4.

The amplified output is rectified by diodes D14 and D15 and the output is led to the inverter provided between the pin 14 and 15 of the same IC. A transistor Q12 also operates as an inverter, the collector of which is connected to the last inverter provided between pin 3 and 2. The output developed at the pin 2 will operate in the similar way as that of pin 4 in case of FM operation.

For connection of the Inverter IC U4, refer to below.

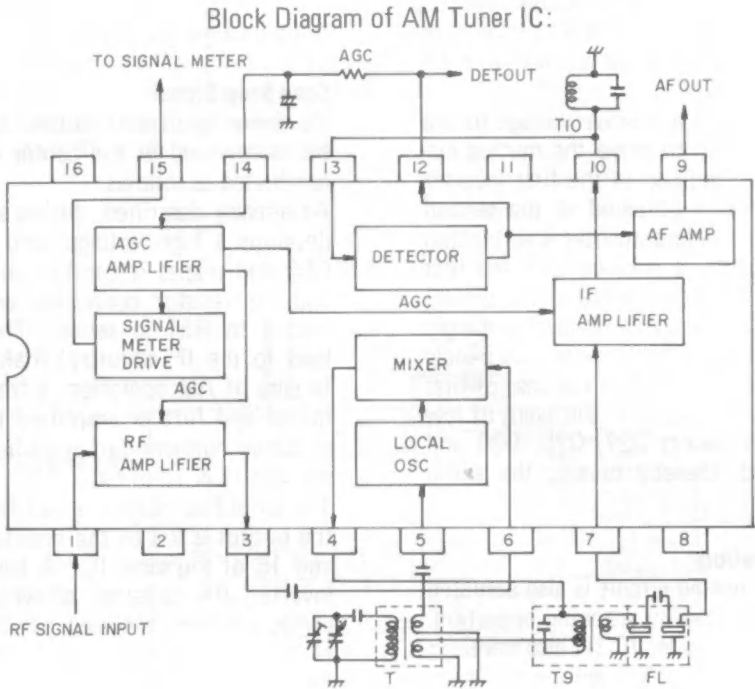


Remote Operation

Command signals for remote operation from P2-RC pre-amplifier are first applied to the decoder ICs U11 and U12. And the decoded output(s) is fed to switching transistor(s) of Q51-Q62 (depending upon the command to be executed), each of which is equivalent of the manual function switch. Transistors Q66 and Q67 and U13 are remote switch which select either AM or FM mode of operation. Transistors Q63 and Q64 are also remote switches for supplying power to the AM or FM circuit.

AM Tuner Circuit

Most of the AM tuner circuits are integrated in one monolithic IC U3 consisting of a RF amplifier, local oscillator, mixer, detector, meter driver, etc. For detailed information refer to the block diagram shown below. Incoming antenna signals are applied to the pin 1 of U3 and the detected audio output is obtained at pin 12, and the amplified audio output is provided at pin 9. The pin 9 output is split into two and applied to each left and right channel LPF filter circuit in the FM MPX stereo circuits through R99, C104 and R126/128. Transistor Q17, the collector of which is connected to the AM and FM audio signal lines, is also one of AM/FM muting circuit.



Service Information

Test Equipment

- Always use the test equipment having known accuracy.
1. FM signal generator: 30–200 MHz
  2. FM MPX stereo modulator
  3. Audio signal generator: 20–20 kHz
  4. Audio analyzer (Distortion meter)
  5. Audio level meter or VTVM: 0.5 mV–10V
  6. Frequency counter: 200 MHz, high input impedance type
  7. Oscilloscope: 1 mV/cm or higher
  8. Center meter or Null meter
  9. DC voltmeter, high input impedance type
  10. FM dummy antenna
  11. Power supply (A2RC and P2RC)

FM Alignment Procedures

Since the tuner has been designed to employ a PLL frequency synthesizer system and electronic tuning circuitry, alignment frequencies must be stored in proper memories before proceeding any alignment.

Store each test frequency as shown below.

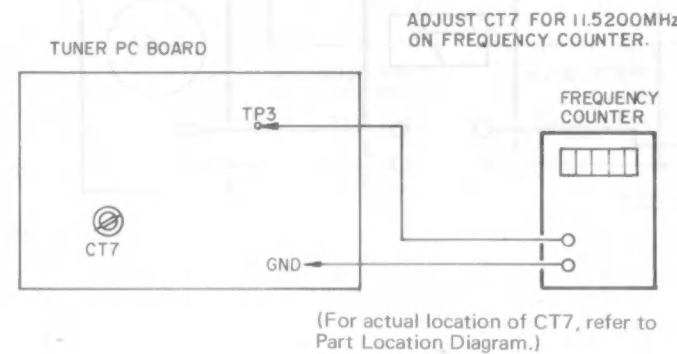
- 87.5 MHz on memory "1"
- 90.0 MHz on memory "2"
- 98.0 MHz on memory "3"
- 106.0 MHz on memory "4"
- 108.0 MHz on memory "5"
- 108.0 MHz on memory "6"
- 96.3 MHz on memory "7"

Frequency Storing Method:

Adjust the tuner so that one of test frequency is indicated on the frequency indicator of the tuner by using manual or auto scanning method and UP or DOWN tuning control buttons. When the specified test frequency is obtained, depress the MW (memory write) button, then the specified memory button (1-7). Repeat the above steps to store all test frequencies on the memories. After completion of storing operation, make sure that each test frequency is stored correctly in the designated memory.

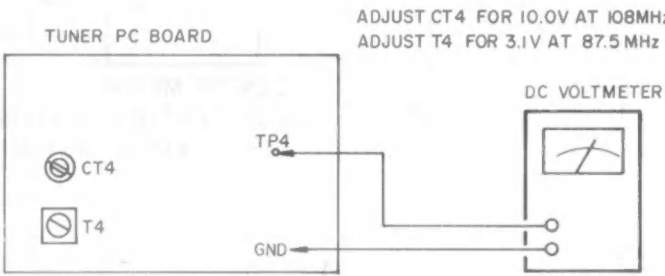
A. PLL Local Oscillator Frequency Circuit Alignment

a) Reference Oscillator Alignment

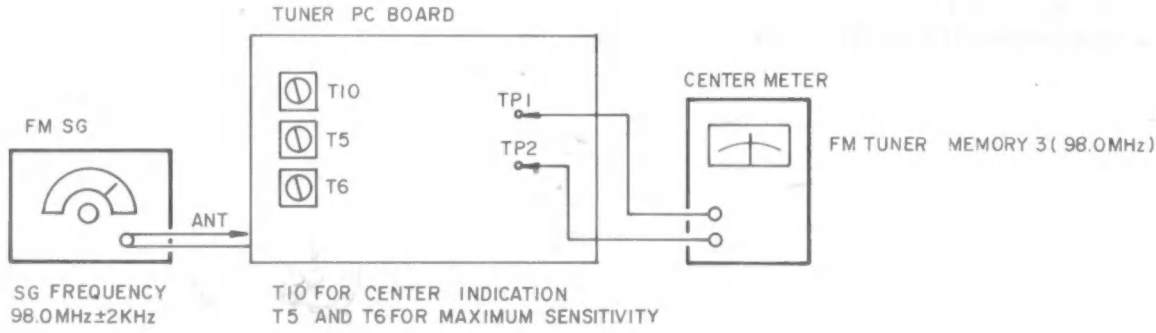


b) Varicap Diode Voltage Alignment

1. Connect a DC voltmeter (high input impedance type) between TP4 and GND on the tuner PC board.
2. Tune the tuner in 108.0 MHz by depressing memory "5" button, then adjust CT4 to obtain 9.6V on the voltmeter.
3. Tune the tuner in 87.5 MHz by depressing memory "1" button, then adjust T4 to obtain 3.1V on the voltmeter.
4. Tune the tuner in 108.0 MHz again and adjust CT4 to obtain 10.0V on the voltmeter.
5. Tune the tuner in 87.5 MHz again and adjust T4 to obtain 3.1V on the voltmeter.
6. Repeat steps 2–5 until 3.1V ± 0.1V is obtained at 87.5V, and 10.0V is obtained at 108.0 MHz.

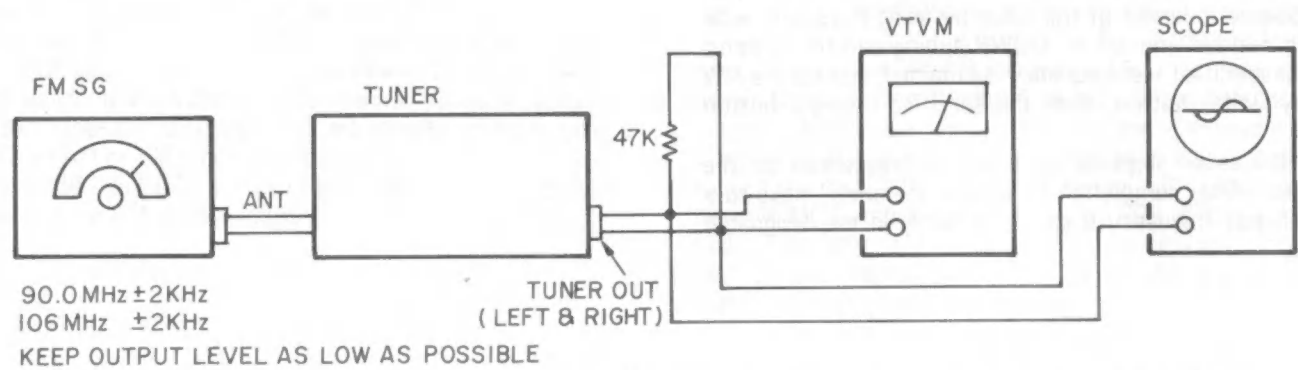


B. IF Circuit Alignment



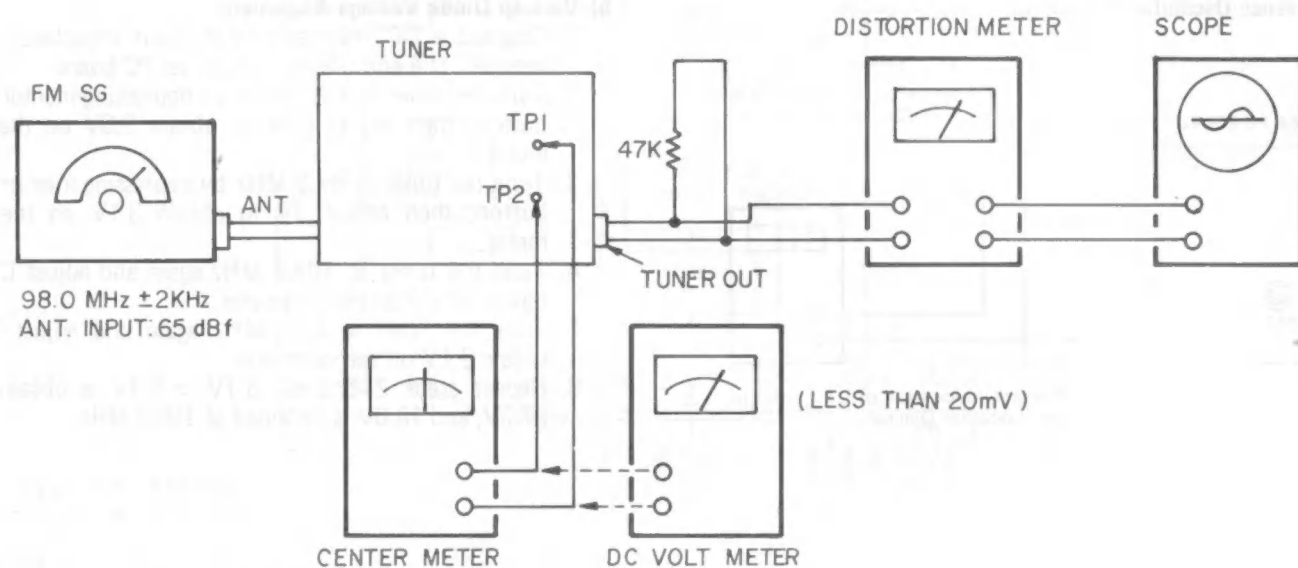


C. FM Front End (Sensitivity) Alignment



ADJUST T1, T2 & T3 FOR MAX SENSITIVITY AT 90.0 MHz  
ADJUST CT1, CT2 & CT3 FOR MAX SENSITIVITY AT 106 MHz

D. Distortion Alignment



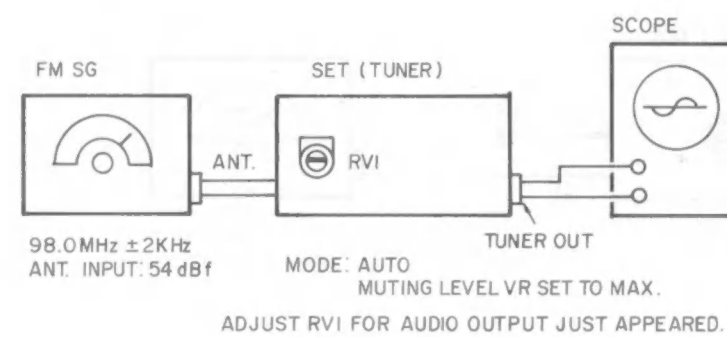
1. ADJUST T10 FOR CENTER INDICATION.
2. ADJUST T11 FOR MINIMUM DISTORTION.

Note:

1. Set signal generator frequency to 98.00 MHz exactly.
2. Center meter should indicate exact center, if not, adjust T10.
3. Adjust T11 for minimum distortion.
4. Adjusting T11 may shift center meter indication, if this is observed, repeat steps 2 and 3.
5. Make sure voltage between TP1 and TP2 is within ±20 mV

under no modulation condition. (If the voltage is higher than the specified value, improper auto stop operation may be caused.)  
6. Minor center meter deflection from its center under no signal condition may be ignored (no realignment is required).

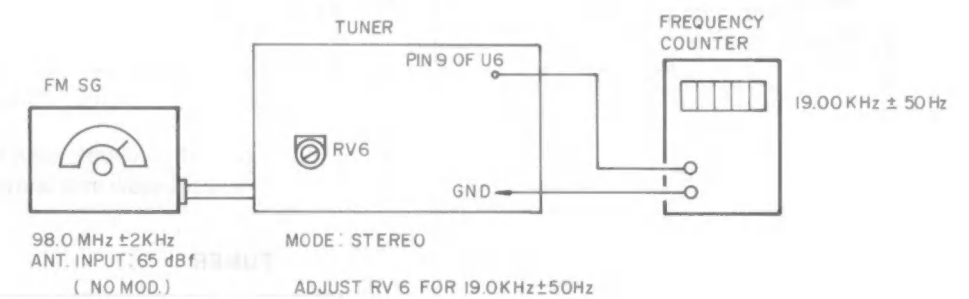
E. Muting Level Adjustment



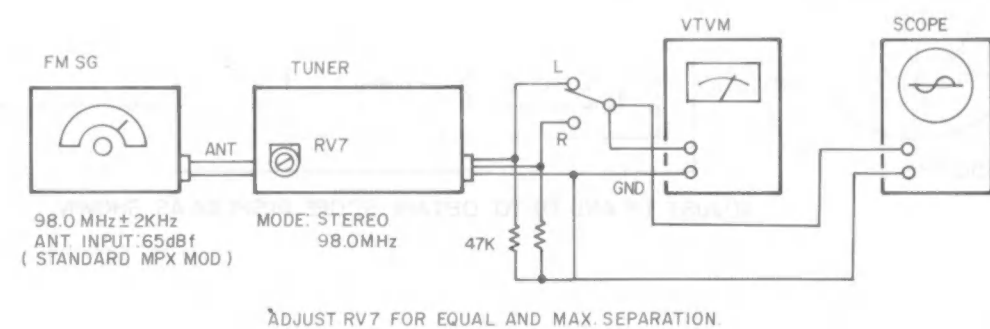
Note:

1. Turn RV1 fully counter clockwise, then slowly turn the RV1 clockwise until an audio output is just obtained on scope display.
2. Next place the Muting Level VR at its mid position, and make sure muting threshold level is about 14–26 dB by decreasing the antenna input signal level.

F. MPX Circuit, 19 kHz Alignment



G. Stereo Separation Alignment



H. Signal Level Meter Alignment

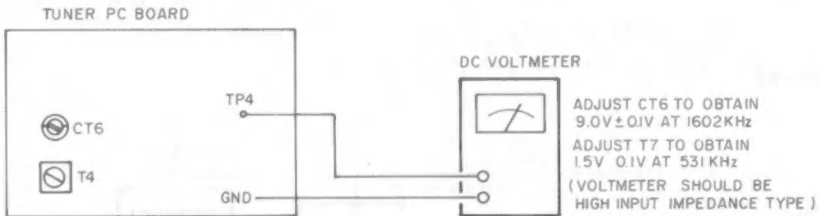
1. Apply 60 dBf antenna input signal to the antenna circuit and adjust RV2 so that all five level meter segments light up.
2. Reduce antenna input signal level to 20 dBf and make sure only the first LED segment light up.
3. Further reduce the signal level to zero and make sure all LED segments turn off.

AM Alignment

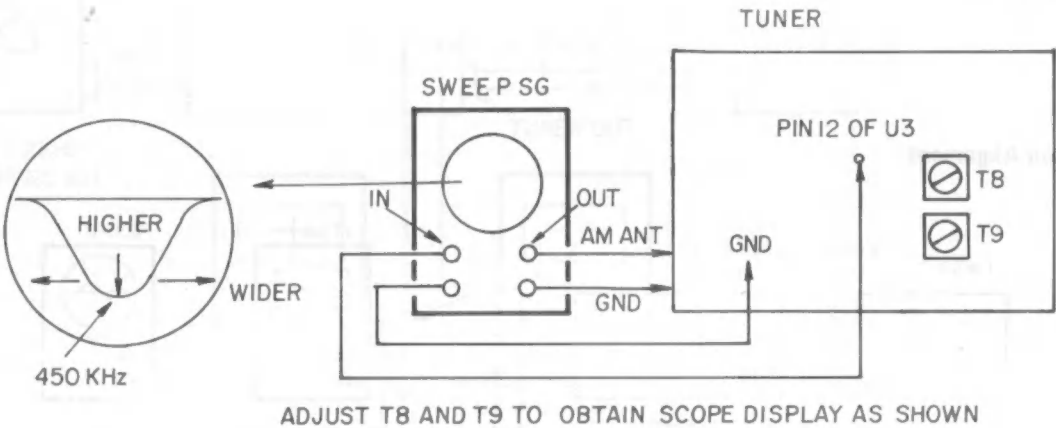
Before proceeding any alignment, store test frequencies on the memories in the similar way described in FM Alignment Section.

- 531 kHz on memory "1"
- 603 kHz on memory "2"
- 999 kHz on memory "3"
- 1404 kHz on memory "4"
- 1602 kHz on memory "5"

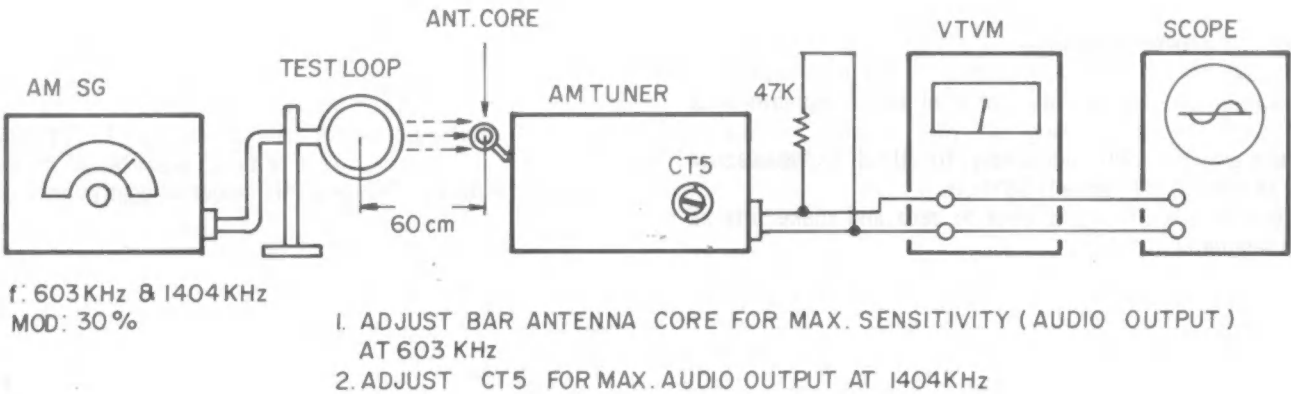
A. PLL Local Oscillator (Varicap Diode Voltage) Alignment



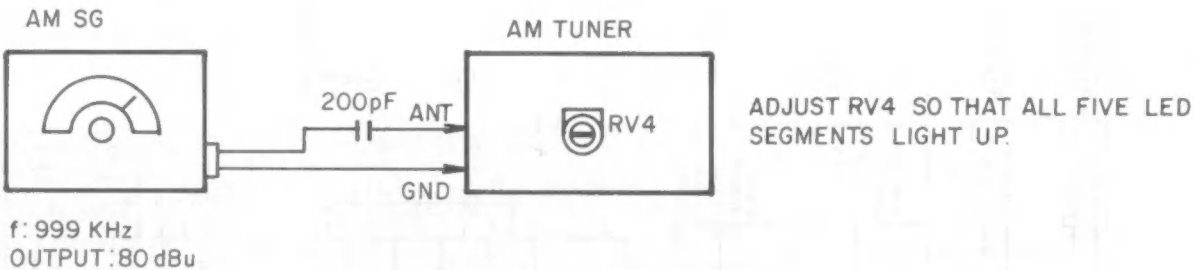
B. IF Alignment



C. AM Sensitivity Alignment



D. AM Sigal Meter Alignment



E. Scan Stop Circuit Alignment

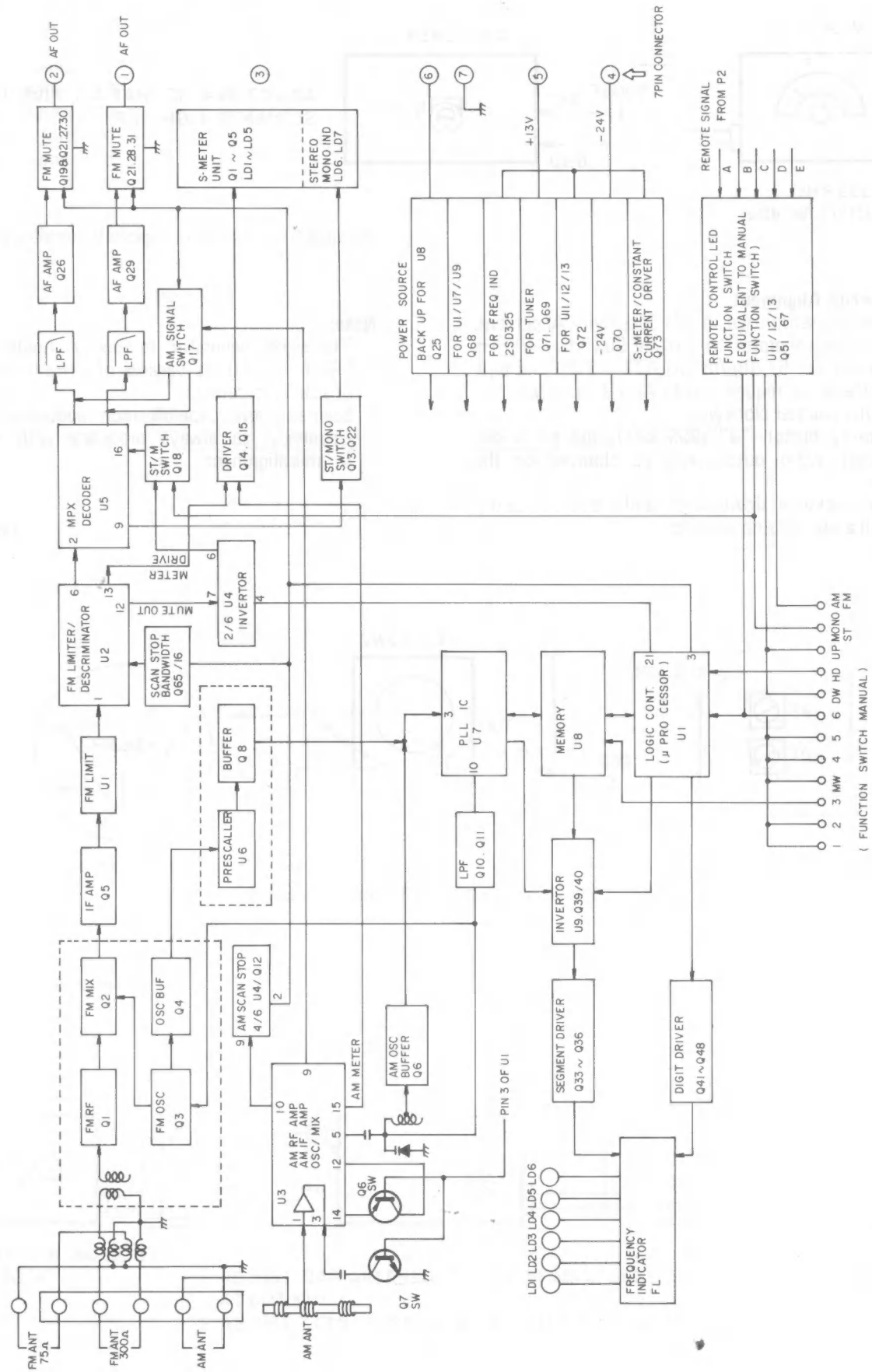
1. Use the same test setup used in AM Sensitivity Alignment.
2. Adjust the signal generator to provide 999 kHz, 400 Hz 30% modulation and 57 dBμ/m (SG ATT: 83 dB) and tune the tuner to the same frequency with AUTO mode set.
3. Turn RV5 fully counter clockwise.
4. Depress memory button "3" (999 kHz), and no or distorted (muted) audio output will be observed on the scope display. Adjust RV5 clockwise slowly until audio output rapidly increases with a normal sine wave form.

Note:

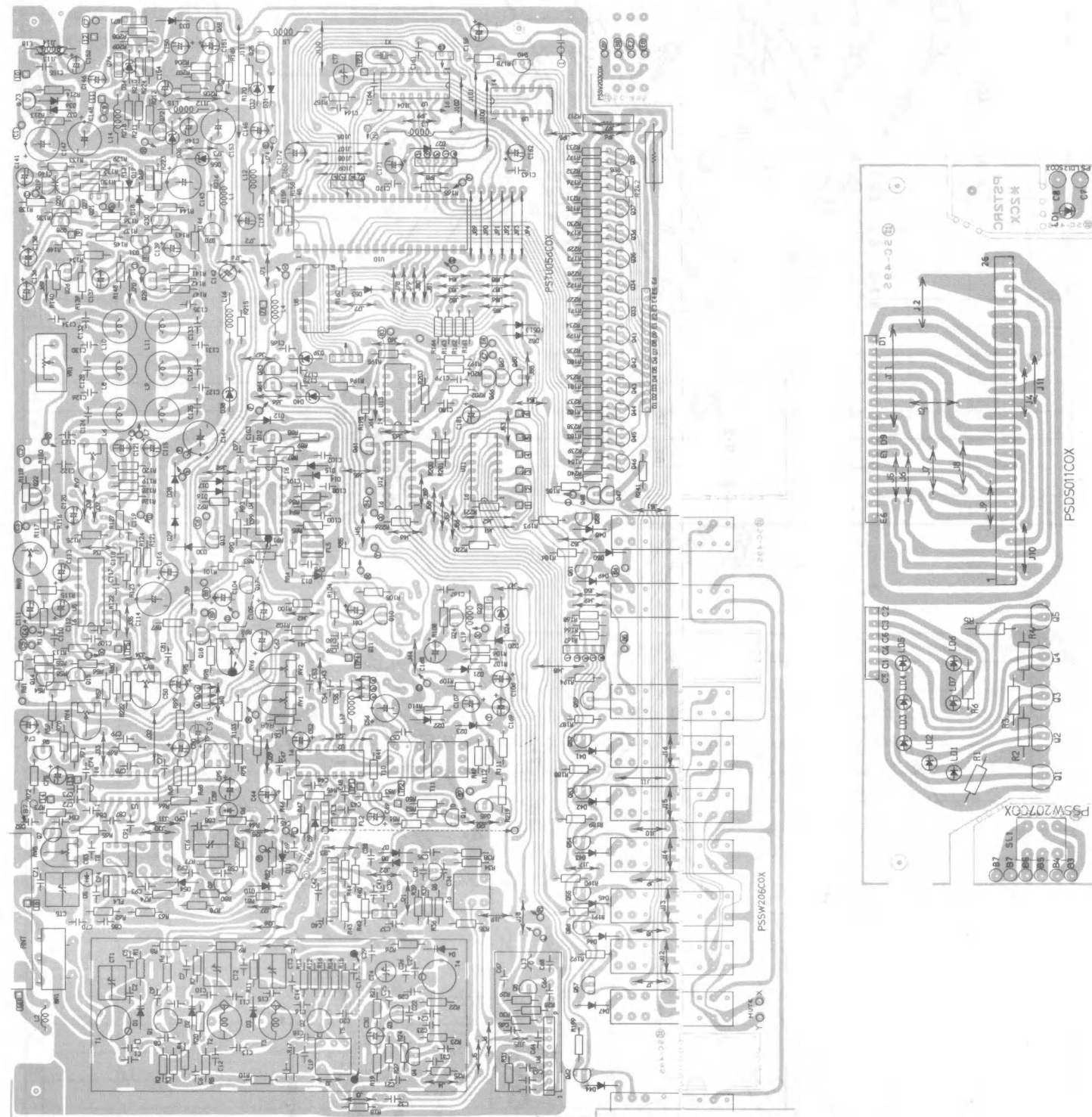
- a. The signal generator frequency should be set within 999 kHz ± 50 Hz because of extra narrow band width of scan stop detector.
- b. Scan stop level depends upon modulation depth and its frequency, so always modulate with 400 Hz, 30% for this alignment.



## Block Diagram



## PC Board Layout





## 19

EXPLODED ASSEMBLY		PART NAME		PART CODE							
		4ECH. ELEMENTS		TFA04A5MCL2							
ITEM NO.	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED	
1	EXPLODED	AMT2RC**01		ESCUTCH IN ASSY		1				1	
2		2NHCL30NSB		HEXA NUT	13, S-BLACK, THIN-TYPE	B22-1	B22-2			2	
3		BRP3055QNB		PAN HEAD RIVET	3MX5.5	B11-1	B11-2			2	
4		BSPC3006NZ		CEMS SCREW	+ BIT, M3 X 6 S-ZNCR	B10-1	B10-2	B10-3	B10-4	6	
5						B10-5	B10-6				
6		BSPL3005NB		BIND NAIL SCREW	+ BIT, M3 X 6 S-BLACK	B12	B13-1	B13-2		3	
7		BSPP3020NB		PAN HEAD SCREW	+ BIT, M3 X 20 S-BLACK	B20				1	
8		BSPP3020NP		PAN HEAD SCREW	+ BIT, M3 X 20 PLASTIC	B21				1	
9		BTPL3008BB		NAIL TAP SCREW	+ BIT, M3 X 8 S-BLACK	B4-1	B4-2	B4-3	B4-4	4	
10		BTPL3008BN		NAIL TAP SCREW		B5-1	B5-2	B5-3	B5-4	4	
11		BTTP2606BB		PAN TAP SCREW		B14-1	B14-2			2	
12		BTTP3008BZ		PAN TAP SCREW	+ BIT, M3 X 8 S-ZNCR	B1-1	B1-2	B1-3	B9-1	6	
13						B9-2	B9-3				
14		BTPW3008BB		BRAS. TAP SCREW	+ BIT, M3 X 8 S-BLACK	B19-1	B19-2	B6-1	B6-2	4	
15		BTPW3008BZ		BRAS. TAP SCREW	+ BIT, M3 X 8 S-ZNCR	B18	B8-1	B8-2	B8-3	5	
16						B8-4					
17		BTPX3008BZ		I.T UT SCREW	+ BIT, M3 X 8 S-ZNCR	B2	B3-1	B3-2	B3-3	4	
18		BWM30A08FR		FIBER WASHER		B24				1	
19		MB841SX003		SIDE BRACKET		4-1	4-2			2	
20		MB851SE005		REAR PANEL		2				1	
21		MB886SM023		COVER		3					

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		MECH. ELEMENTS		TEA04AS4CL2			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		ME11XCC001		ADDER		16	1
2		MF422P001		HOLDER		32	1
3		MH632P011		HOLDER		11	1
4		ML243S011		PCB SOCKET		24	1
5		ML321SL001		PCB SOCKET		7-1 7-2	2
6		MM400P001		HOLDER		10	1
7		MS555S001		PCB SOCKET		26	1
8		MS755S001		PCB SOCKET		5	1
9		MZ332SZ001		PCB SOCKET		12	1
10		VB432SB001		SUPPORT		6-1 6-2	2
11		VF152S002		BUTTON PHILIP		74	1
12		VF172S004		BUTTON PHILIP		17-1 17-2	2
13		VM165R005		WHEEL		77	1
14		VN211SM009		BUTTON		14-1 14-10 14-2 14-3	10
15						14-4 14-5 14-6 14-7	
16						14-8 14-9	
17		VN221SM010		BUTTON		15-1 15-2	2
18		VN276SB023		KEY			1
19		VS515YB001		SCREW		7-1 7-2	2
20		VS703YF001		SCREW		7-1 7-2 7-3 7-4	4
21		VS733AK001		PLATE		11	1

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.A. BOARD ASSY		APST0356ND			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		MW401CX001		SHORT JUMPER			1
2		PS05011C0X		PRINTED CIRCUIT			1
3		PST2RC#2CX		PRINTED CIRCUIT			1
4		LLBLN217KN		L.E.D.	LN217RP RED	LED7	1
5		LLBLN317GN		L.E.D.	LN317GP GREEN	LED1 LED2 LED3 LED4	6
6						LED5 LED6	
7		JTC1085XAN		TRANSISTOR	2SC1635 Q.P-RANK	Q1 Q2 Q3 Q4	5
8						Q5	
9		RD25PJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R2 R4 R5	3
10		RD25TJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R1 R3	2
11		VS427RB001		FL SPONGE		B3	1
12		VS439RB002		SPONGE LFO		B3	1
13		WP071200GT		PC-JOINT		JU1	1
14		WP081200GT		PC-JOINT		JU2	1
15		WUG137EEXX		HI-WRAP WIRE		NO1	1
16		WUG245EEXX		HI-WRAP WIRE		NO2	1
17		WUG348EEXX		HI-WRAP WIRE		NO3	1
18		WUG450EEXX		HI-WRAP WIRE		NO4	1
19		WUG550EEXX		HI-WRAP WIRE		NO5	1
20		WUG657EEXX		HI-WRAP WIRE		NO6	1
21		ZLFIP7D9XA		F.O. INDICATOR		LT1	1

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		MECH. ELEMENTS		TEA04AS4CL2			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		VS815YB001		SCREW		19-1 19-2 19-3 19-4	4
2		VVL511GE02		LABEL		21	1
3		VVL611GE05		LABEL		34	1
4		ZAT0015002		ANTENNA			1
5		KPT2RC#E01		INNER CARTON			1
6							
7							
8							
9							

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.A. BOARD ASSY		APST0356ND			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		CC0804J0COM		CERAMIC CAP.	SL 4PF 50V -0.25, +0.25PF	C28	1
2		CC0805J0CM		CERAMIC CAP.	SL 5PF 50V -0.25, +0.25PF	C166	1
3		CC030700CM		CERAMIC CAP.		C26	1
4		CC030700DM		CERAMIC CAP.	SL 7PF 50V -0.5, +0.5PF	C1	1
5		CC031000CM		CERAMIC CAP.	CH 10PF 50V -0.5, +0.5PF	C23	1
6		CC031000DM		CERAMIC CAP.		C25	1
7		CC031000DM		CERAMIC CAP.	SL 10PF 50V -0.5, +0.5PF	C31	1
8		CC031200CM		CERAMIC CAP.	12PF 50V -10, +10% SL	C11 C14	2
9		CC03220K0M		CERAMIC CAP.	22PF 50V -10, +10% SL	C10	1
10		CC03330KCM		CERAMIC CAP.	33PF 50V -10, +10% CH	C22	1
11		CC03471K0M		CERAMIC CAP.	470PF 50V -10, +10% SL	C79	1
12		CCF0151K0I		CERAMIC CAP.	150PF 50V -10, +10% SL	C92	1
13		CCF0221K0T		CERAMIC CAP.	220PF 50V -10, +10% SL	C59	1
14		CCG03030COT		CERAMIC CAP.	SL 3PF 50V -0.25, +0.25PF	C29	1
15		CCG0101K0T		CERAMIC CAP.	100PF 50V -10, +10% SL	C117 C140	2
16		CCG0270K0T		CERAMIC CAP.	22PF 50V -10, +10% SL	C98	1
17		CCG0270K0T		CERAMIC CAP.	27PF 50V -10, +10% SL	C43 C69	2
18		CCG0330K0T		CERAMIC CAP.	33PF 50V -10, +10% SL	C164 C48	2
19		CCG0470K0T		CERAMIC CAP.	47PF 50V -10, +10% SL	C73	1
20		CCG0560K0T		CERAMIC CAP.	56PF 50V -10, +10% SL	C32 C94	2
21		CCG0320K0T		CERAMIC CAP.	32PF 50V -10, +10% SL	C58	1



EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSTU0560D			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		CEA221ALX		ELYT. CAPACITOR	220MFD 10V	C159	1
2		CEA221ALX		ELYT. CAPACITOR	220MFD 10V	C114 C142 C30	3
3		CEA3470ALX		ELYT. CAPACITOR	47MFD 10V	C95	1
4		CEA3471ALX		ELYT. CAPACITOR	47MFD 10V	C143 C148	2
5		CEAGR22ZM		ELYT. CAPACITOR	0.22MFD 50V MS	C113	1
6		CEAG2M2ALX		ELYT. CAPACITOR	2.2MFD 50V	C169	1
7		CEAG221ALX		ELYT. CAPACITOR	220MFD 50V	C197	1
8		CEA3470ALX		ELYT. CAPACITOR	47MFD 50V	C188	1
9		CEVC220ALX		ELYT. CAPACITOR		C162	1
10		CEVC221ALX		ELYT. CAPACITOR		C144	1
11		CEVC470ALX		ELYT. CAPACITOR		C145 C149 C150	3
12		CEVC100ALX		ELYT. CAPACITOR		C105 C115 C116 C120	8
13						C121 C52 C75 C76	
14		CEVD101ALX		ELYT. CAPACITOR		C56	1
15		CEVD470ALX		ELYT. CAPACITOR		C168 C62	2
16		CEVE343ALX		ELYT. CAPACITOR		C111	1
17		CEV447ALX		ELYT. CAPACITOR		C104 C135 C137 C139	9
18						C139 C142 C44 C50	
19						C48	
20		CEVE470ALX		ELYT. CAPACITOR		C153	1
21		CEVGR47ALX		ELYT. CAPACITOR		C146 C151 C171	3

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSTU0560D			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		CKF3472ZFT		CERAMIC CAP.	4700PF 50V -20, +80% F	C36 C66	2
2		CKFB473ZFT		CERAMIC CAP.	0.047MFD 50V -20, +80% F	C109 C154 C155 C163	18
3						C165 C170 C173 C177	
4						C178 C51 C53 C54	
5						C55 C57 C65 C82	
6						C85 C93	
7		CKGB102ZFT		CERAMIC CAP.	1000PF 50V -20, +80% F	C190	1
8		CKG9691KBT		CERAMIC CAP.		C134 C135	2
9		CQMB102KTH		MYLAR CAPACITOR	1000PF 50V -10, +10%	C122 C123	2
10		CQMB103KEH		MYLAR CAPACITOR	0.01MFD 50V -10, +10%	C77	1
11		CQMB152KTH		MYLAR CAPACITOR		C130 C131	2
12		CQMB222KTH		MYLAR CAPACITOR	2200PF 50V -10, +10%	C126 C127	2
13		CQMB333KTH		MYLAR CAPACITOR	0.033MFD 50V -10, +10%	C179 C60	2
14		CQMB683KEH		MYLAR CAPACITOR	0.068MFD 50V -10, +10%	C103	1
15		CQSC102JCF		STYROFLEX CAP.		C128 C129	2
16		CQSC122JCF		STYROFLEX CAP.		C118 C119	2
17		CQSC192JCF		STYROFLEX CAP.	1800PF 100V -5, +5%	C132 C133	2
18		CQSC251JCF		STYROFLEX CAP.		C124 C125	2
19		CQSC471JCF		STYROFLEX CAP.	470PF 100V -5, +5%	C110 C90	2
20		CTX1080P06		TRIMMER CAP.		CT1 CT2 CT3 CT6	4
21		CTX1150P01		TRIMMER CAP.		CT5	1

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSTU0560D			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		CEV3110ALX		ELYT. CAPACITOR		C106 C107 C112 C141	7
2						C191 C49 C61	
3		CE243068M		CERAMIC CAP.		C28	1
4		CKD102ZFT		CERAMIC CAP.	1000PF 50V -20, +80% F	C3 C5	2
5		CKD103ZFT		CERAMIC CAP.	0.01MFD 50V -20, +80% F	C10 C12 C13 C15	13
6						C167 C18 C2 C24	
7						C27 C4 C5 C6	
8						C7	
9		CKD223ZFT		CERAMIC CAP.	0.022MFD 50V -20, +20% F	C17 C185 C19 C21	4
10		CKD472ZFT		CERAMIC CAP.	4700PF 50V -20, +80% F	C9	1
11		CKD473ZFT		CERAMIC CAP.	0.047MFD 50V -20, +20% F	C168 C186	2
12		CKFB103ZFT		CERAMIC CAP.	0.01MFD 50V -20, +80% F	C101 C161 C34 C64	11
13						C67 C72 C81 C83	
14						C84 C85 C91	
15		CKF152KBT		CERAMIC CAP.		C63	1
16		CKFB223ZFT		CERAMIC CAP.	0.022MFD 50V -20, +80% F	C100 C102 C35 C37	20
17						C38 C39 C40 C41	
18						C42 C45 C46 C47	
19						C70 C74 C78 C79	
20						C88 C89 C97 C99	
21		CKFB332KBT		CERAMIC CAP.	3300PF 50V -10, +10% F	C58	1

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSTU0560D			
1	REMARKS	PART CODE	PART STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		CTZ6100H01		TRIMMER CAP.		CT4	1
2		CTZ6300H01		TRIMMER CAP.		CT7	1
3		FB9450A01M		CERAMIC FILTER		FL4 FL5	2
4		FB1087F17M		CERAMIC FILTER		FL1	1
5		FB1087F19M		CERAMIC FILTER		FL2 FL3	2
6		LCA9A303BA		RF COIL		L1 L12 L14 L15	11
7						L16 L17 L18 L19	
8						L3 L4 L5	
9		LF151KA01T		R.F.C.		L2	1
10		LF180JC01K		RF COIL		L13	1
11		LF393JC01K		RF COIL		L10 L11	2
12		LF563JC01K		RF COIL		L8 L9	2
13		LF691KA01S		RF COIL		L20	1
14		LF683JC01K		RF COIL		L6 L7	2
15		MB531SD001		SHIELD CASE		SL1 SL4	2
16		MB532SD001		SHIELD CASE		SL4	1
17		MB751SD002		SHIELD CASE		SL3	1
18		MB753SD002		SHIELD CASE		SL2	1
19		MS755SD001		SHIELD CASE		SL5	1
20		YW401CX005		SHORT JUMPER	JW-15		15
21		YW401CX008		SHORT JUMPER			1



EXPLODED ASSEMBLY	PART NAME	PART CODE	
REMARKS	PART CODE	PART STOCK NUMBER	PART NAME
1	MM4J1CK009		SHORT JUMPER
2	MM4J1CK012		SHORT JUMPER
3	PSS4206C0X		POWER TRIP
4	PSTU056CJX		PRINTED BOARD
5	PST23C01CX		PRINTED BOARD
6	10C383L94J		VARICAP DIODE 150V A-1 2PCS-SAME-RANK
7	10CTT310LJ		VARICAP DIODE
8	10SL160KXT		GERMANY DIODE 1N60 NO-RANK
9	10SM415JXN		10SL160 VZ 1.7V-7.9V 35V A-RANK 24PIN
10			
11			
12			
13			
14			
15			
16			
17			
18	10ZA1047XN		ZENER DIODE 1A1047 VZ 4.4-5.0V NOM. 4.7V
19	10ZA1075XN		ZENER DIODE 1A1075 VZ 7.0-7.9V NOM. 7.5V
20	10Z220193A		ZENER DIODE 10Z220 VZ 19.23-20.22V
21	10Z5R65H3A		ZENER DIODE 10Z5R65 VZ 5.61-5.91V

EXPLODED ASSEMBLY	PART NAME	PART CODE	
REMARKS	PART CODE	PART STOCK NUMBER	PART NAME
1	1TC1575XJA		TRANSISTOR 1TC1575 NPN-40K
2	1TC1585XAN		TRANSISTOR 1TC1585 NPN-RANK
3			
4			
5			
6			
7			
8			
9			
10			
11	1TC1346XAN		TRANSISTOR 1TC1346 NPN-RANK
12	1T003254CC		TRANSISTOR 1T00325 NPN-RANK
13	1T00636XAN		TRANSISTOR 1T00636 NPN-RANK
14	1TK0068XBA		TRANSISTOR 1TK0068 NPN-RANK
15	1TC1345XAB		TRANSISTOR 1TC1345 NPN-RANK
16	R025PJ100X		CARBON FILM R. 0.25W 10 OHM 5%
17	R025PJ101X		CARBON FILM R. 0.25W 100 OHM 5%
18			
19			
20	R025PJ102X		CARBON FILM R. 0.25W 1K OHM 5%
21	R025PJ103X		CARBON FILM R. 0.25W 10K OHM 5%

EXPLODED ASSEMBLY	PART NAME	PART CODE	
REMARKS	PART CODE	PART STOCK NUMBER	PART NAME
1	10Z8R613JA		ZENER DIODE 10Z8R613 VZ 8.03-9.45V
2	10Z9A1613JA		ZENER DIODE 10Z9A1613 VZ 9.03-10.30V
3	11MA63214		I.C. 11MA6321 7-PIN 1/PD DIVIDER
4	11A114500H		I.C. 11A114500
5	11A935557A		I.C. 11A93555H
6	11A111613A		I.C. 11A111613C
7	11A111734A		I.C. 11A111734C
8	11A111225A		I.C. 11A11125 FM-IF SYSTEM
9	11A112033N		I.C. 11A1203 256-BIT CMOS STATIC RAM
10	11A1125142N		I.C. 11A1125 15-PIN RADIO PLL SYNTHESIZER
11	11A112492A		I.C. 11A112492
12	11A112492A		I.C. 11A112492
13	11A112492A		I.C. 11A112492
14	11A112492A		I.C. 11A112492
15	11A112492A		I.C. 11A112492
16	11A112492A		I.C. 11A112492
17	11A112492A		I.C. 11A112492
18	11A112492A		I.C. 11A112492
19	11A112492A		I.C. 11A112492
20	11A112492A		I.C. 11A112492
21	11A112492A		I.C. 11A112492

EXPLODED ASSEMBLY	PART NAME	PART CODE	
REMARKS	PART CODE	PART STOCK NUMBER	PART NAME
1			
2			
3	R025PJ104X		CARBON FILM R. 0.25W 100K OHM 5%
4			
5			
6			
7			
8			
9			
10	R025PJ105X		CARBON FILM R. 0.25W 1M OHM 5%
11	R025PJ123X		CARBON FILM R. 0.25W 12K OHM 5%
12	R025PJ124X		CARBON FILM R. 0.25W 120K OHM 5%
13	R025PJ151X		CARBON FILM R. 0.25W 150 OHM 5%
14	R025PJ152X		CARBON FILM R. 0.25W 1.5K OHM 5%
15	R025PJ153X		CARBON FILM R. 0.25W 15K OHM 5%
16	R025PJ154X		CARBON FILM R. 0.25W 150K OHM 5%
17	R025PJ181X		CARBON FILM R. 0.25W 180 OHM 5%
18	R025PJ183X		CARBON FILM R. 0.25W 18K OHM 5%
19	R025PJ184X		CARBON FILM R. 0.25W 180K OHM 5%
20	R025PJ221X		CARBON FILM R. 0.25W 220 OHM 5%
21	R025PJ222X		CARBON FILM R. 0.25W 2.2K OHM 5%

EXPLODED ASSEMBLY		PART NAME		PART CODE						
		P.W.BOARD ASSY		APSTU056BD						
LINE	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		RD25PJ223X		CARBON FILM R.	0.25W 22K OHM 5%	R101	R119	R122	R130	9
2						R178	R205	R36	R41	
3						R50				
4		RD25PJ224X		CARBON FILM R.	0.25W 220K OHM 5%	R47	R55	R58		3
5		RD25PJ225X		CARBON FILM R.	0.25W 2.2M OHM 5%	R202	R94			2
6		RD25PJ270X		CARBON FILM R.	0.25W 27 OHM 5%	R20				1
7		RD25PJ271X		CARBON FILM R.	0.25W 270 OHM 5%	R46				1
8		RD25PJ272X		CARBON FILM R.	0.25W 2.7K OHM 5%	R105	R134	R142	R215	5
9						R37				
10		RD25PJ273X		CARBON FILM R.	0.25W 27K OHM 5%	R141	R24			2
11		RD25PJ274X		CARBON FILM R.	0.25W 270K OHM 5%	R62	R78			2
12		RD25PJ303X		CARBON FILM R.	0.25W 30K OHM 5%	R117	R83			2
13		RD25PJ331X		CARBON FILM R.	0.25W 330 OHM 5%	R223				1
14		RD25PJ332X		CARBON FILM R.	0.25W 3.3K OHM 5%	R212	R28	R80		3
15		RD25PJ333X		CARBON FILM R.	0.25W 33K OHM 5%	R131	R66	R89		3
16		RD25PJ390X		CARBON FILM R.	0.25W 39 OHM 5%	R214				1
17		RD25PJ392X		CARBON FILM R.	0.25W 3.9K OHM 5%	R104	R135	R136	R143	6
18						R144	R31			
19		RD25PJ393X		CARBON FILM R.	0.25W 39K OHM 5%	R161	R162	R163	R164	5
20						R54				
21		RD25PJ394X		CARBON FILM R.	0.25W 390K OHM 5%	R219				1

EXPLODED ASSEMBLY		PART NAME		PART CODE						
		P.W.BOARD ASSY		APSTU056BD						
LINE	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		RD25PJ470X		CARBON FILM R.	0.25W 47 OHM 5%	R10	R18	R222	R35	5
2						R75				
3		RD25PJ471X		CARBON FILM R.	0.25W 470 OHM 5%	R25	R39	R43	R44	4
4		RD25PJ472X		CARBON FILM R.	0.25W 4.7K OHM 5%	R158	R159	R160	R166	10
5						R167	R168	R195	R196	
6						R48	R99			
7		RD25PJ473X		CARBON FILM R.	0.25W 47K OHM 5%	R123	R124	R132	R133	13
8						R200	R201	R204	R207	
9						R29	R30	R85	R91	
10						R98				
11		RD25PJ474X		CARBON FILM R.	0.25W 470K OHM 5%	R15	R186	R187	R188	16
12						R189	R190	R191	R192	
13						R193	R194	R197	R198	
14						R199	R40	R74	R89	
15		RD25PJ561X		CARBON FILM R.	0.25W 560 OHM 5%	R116	R209	R59		3
16		RD25PJ562X		CARBON FILM R.	0.25W 5.6K OHM 5%	R108	R171	R172	R173	18
17						R174	R175	R176	R177	
18						R179	R180	R181	R182	
19						R133	R184	R224	R240	
20						R96				
21		RD25PJ563X		CARBON FILM R.	0.25W 56K OHM 5%	R129	R57			2

EXPLODED ASSEMBLY		PART NAME		PART CODE						
		P.W. BOARD ASSY		APSTU056BD						
1	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.				QTY USED
1		RD25PJ564X		CARBON FILM R.	0.25W 560K OHM 5%	R109	R110	R111		3
2		RD25PJ682X		CARBON FILM R.	0.25W 6.8K OHM 5%	R126	R128	R206	R51	5
3						R82				
4		RD25PJ683X		CARBON FILM R.	0.25W 68K OHM 5%	R14				1
5		RD25PJ821X		CARBON FILM R.	0.25W 820 OHM 5%	R16	R79			2
6		RD25PJ822X		CARBON FILM R.	0.25W 8.2K OHM 5%	R140	R148	R170	R60	4
7		RD25PJ823X		CARBON FILM R.	0.25W 82K OHM 5%	R42	R77			2
8		RD25PJ911X		CARBON FILM R.	0.25W 910 OHM 5%	R139	R147			2
9		RD25TJ103X		CARBON FILM R.	0.25W 10K OHM 5%	R73				1
10		RD25TJ122X		CARBON FILM R.	0.25W 1.2K OHM 5%	R61				1
11		RD25TJ223X		CARBON FILM R.	0.25W 22K OHM 5%	R185	R242			2
12		RD25TJ273X		CARBON FILM R.	0.25W 27K OHM 5%	R149				1
13		RD25TJ393X		CARBON FILM R.	0.25W 39K OHM 5%	R53				1
14		RD25TJ433X		CARBON FILM R.	0.25W 43K OHM 5%	R67				1
15		RD25TJ564X		CARBON FILM R.	0.25W 560K OHM 5%	R93				1
16		RD25T00000		CARBON R.						1
17		RGHARJ102B		M-OXIDE FILM R.		R218				1
18		RGHARJ330B		M-OXIDE FILM R.		R169				1
19		RGLARJ391B		M-OXIDE FILM R.		R208				1
20		RGZARJ271B		M-OXIDE FILM R.		R217				1
21		RPGN320201		SEMI-FIXED VR.	2K OHM B-CURVE	RV1	RV4			2

EXPLODED ASSEMBLY		PART NAME		PART CODE				
		P.W.BOARD ASSY		APSTUC563D				
ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.		QTY USED
1		RPGN320301		SEMI-FIXED VR.	20K OHM B-CURVE	RV2		1
2		RPGN320401		SEMI-FIXED VR.	200K OHM B-CURVE	RV7		1
3		RPGN350201		SEMI-FIXED VR.	5K OHM B-CURVE	RV3	RV5	2
4		RPJVB10302		SEMI-FIXED VR.	10K OHM B-CURVE	RV8		1
5		RVNA503C03		VR.		VR1		1
6		RX1ARJ100B		M-OXIDE FILM R.		R210		1
7		SP02EBX01A		PUSH SWITCH		S1		1
8		SP03CBX01A		PUSH SWITCH		S2		1
9		TRA7JZ007S		RF COIL		T1		1
10		TR072A002S		I.F.T.		T8	T9	2
11		TR10MA013S		IFT		T5	T6	2
12		TR10MM018K		RF COIL		T10		1
13		TR10MM019K		RF COIL		T11		1
14		TR10M2002M		RF COIL		T3		1
15		TR10MQ003M		RF COIL		T2		1
16		TR10MQ005M		RF COIL		T4		1
17		TR10M2005S		RF COIL		T7		1
18		TV750301A2		BALANCE COIL		RA1		1
19		WDH015Z001		COAXIAL CABLE		W024		1
20		WP040800GT		PC-JOINT		JU1		1
21		WP051800GT		PC-JOINT		JU2		1

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSTU056BD			
ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		WGG520AAAA		SHIELDED WIRE		N025	1
2		WUGP16EEXX		HI-WRAP WIRE		N022	1
3		WUGL18EEXX		HI-WRAP WIRE		N09	1
4		WUG211EEXX		HI-WRAP WIRE		N01	1
5		WUG227EEXX		HI-WRAP WIRE		N010	1
6		WUG312EEXX		HI-WRAP WIRE		N02	1
7		WUG318EEXX		HI-WRAP WIRE		N011	1
8		WUG410EEXX		HI-WRAP WIRE		N012	1
9		WUG415EEXX		HI-WRAP WIRE		N03	1
10		WUG510EEXX		HI-WRAP WIRE		N04	1
11		WUG515EEXX		HI-WRAP WIRE		N019	1
12		WUG616EEXX		HI-WRAP WIRE		N05	1
13		WUG620EEXX		HI-WRAP WIRE		N014	1
14		WUG713EEXX		HI-WRAP WIRE		N016	1
15		WUG716EEXX		HI-WRAP WIRE		N06	1
16		WUG809EEXX		HI-WRAP WIRE		N07	1
17		WUG313EEXX		HI-WRAP WIRE		N017	1
18		WUG907EEXX		HI-WRAP WIRE		N020	1
19		WUG913EEXX		HI-WRAP WIRE		N018	1
20		WUG918EEXX		HI-WRAP WIRE		N08	1
21		WUG924EEXX		HI-WRAP WIRE		N021	1

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSTU056BD			
ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		WUG733EEXX		HI-WRAP WIRE		N023	1
2		XAZ184001X		XTAL OSCILLATOR		X1	1
3							
4							
5							
6							
7							
8							
9							

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSTU056BD			
ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		PSSW203C0X		PRINTED W. BOARD			1
2		SP02CEXJ2A		PUSH SWITCH		S1	1
3		WUGH46EEXX		HI-WRAP WIRE		N03	1
4		WUG446EEXX		HI-WRAP WIRE		N04	1
5		WUG728EEXX		HI-WRAP WIRE		N01	1
6		WUG823EEXX		HI-WRAP WIRE		N02	1
7							
8							
9							

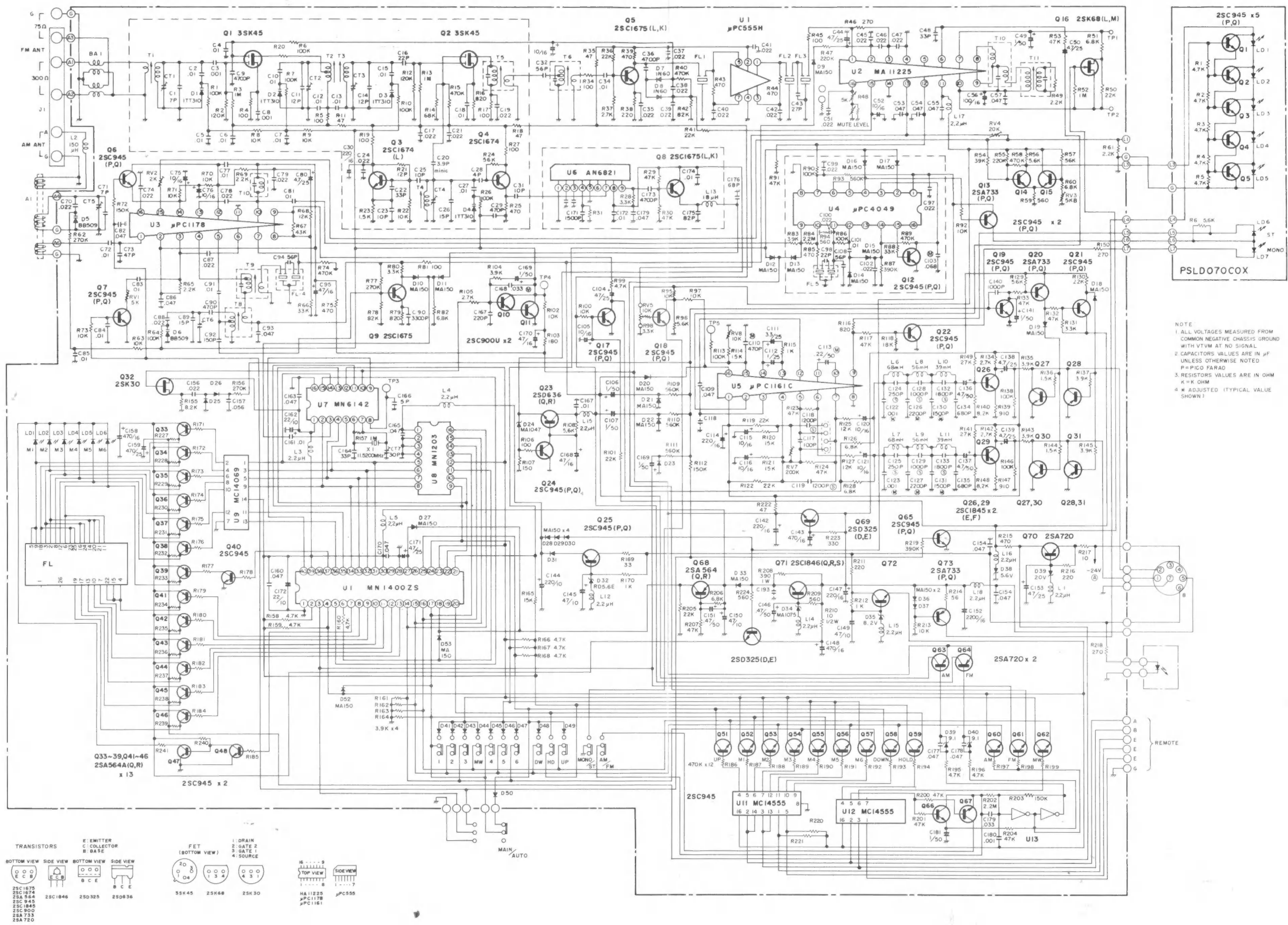
EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APST2RC#21			
ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1	EXPLODED	APSO5011AA		P.W. BOARD ASSY			1
2	EXPLODED	APSLD125AA		P.W. BOARD ASSY			1
3							

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APST2RC#12			
ITEM	REMARKS	CYBERNET PART CODE	CUSTOMER'S PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1	EXPLODED	APSSW2J3AA		P.W. BOARD ASSY			1
2	EXPLODED	APSTU056BD		P.W. BOARD ASSY			1
3							

EXPLODED ASSEMBLY		PART NAME		PART CODE			
		P.W. BOARD ASSY		APSLD125AA			
ITEM	REMARKS	PART CODE	PART, STOCK NUMBER	PART NAME	SPECIFICATIONS	SYMBOLIC OR EXPLODED VIEW NO.	QTY USED
1		PSLD125C0X		PRINTED W. BOARD			1
2		WUG230EEXX		HI-WRAP WIRE		N02	1
3		WUG230EEXX		HI-WRAP WIRE		N01	1
4							
5							
6							
7							
8							
9							



## Schematic Diagram





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